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ABSTRACT

A college reading laboratory was designed and furnished to maximize flexibility in space use. To determine the effectiveness of the design and use of space, a two-part study was conducted that examined students' learning preferences and collected instructors' observations. Responses indicated student preferences for sound, light, warmth, and formal room design. The emotionality subscale showed students to be motivated, persistent, and responsible. However, over half revealed a strong need for guidance and structure in completing tasks. Sociologically, students reported preferences for learning alone, learning with peers, learning under direct supervision, and learning in different sociological settings. In the physical needs variable cluster, the population revealed that it had predominantly multimodal preferences for visual, kinesthetic, and tactile learning. Instructor observations led to three conclusions about the lab design and use of space: the reduction of square footage caused students' productivity to increase dramatically; space differentiation and mobility facilitated increased productivity; and the small space did not allow for private conferences, materials development, and intensified instruction for deficient readers. (HOD)

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Space Design and Use in a College Reading Laboratory

A

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Space Design and Use in a College Reading Laboratory

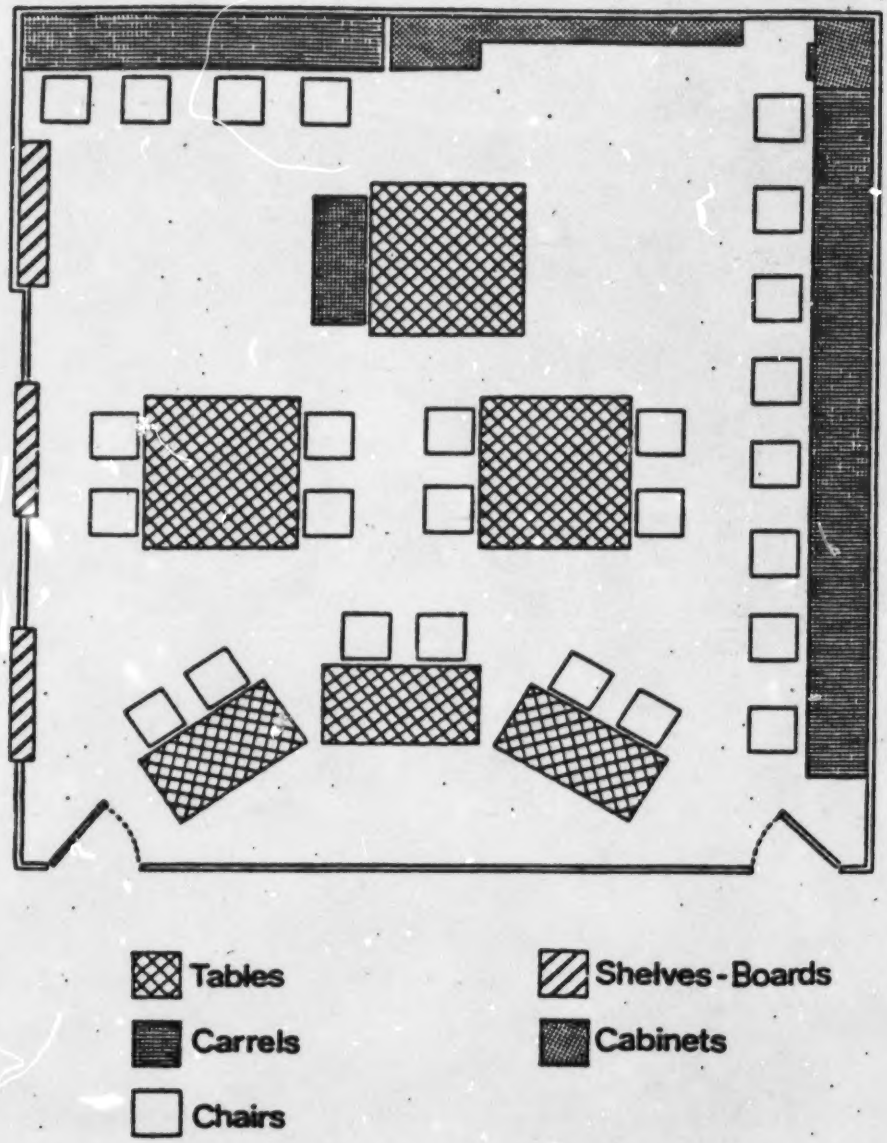
Recently, we moved the University Reading Laboratory from a large room (1800 square feet) in an older building to a smaller room (900 square feet) in a new building. In doing so, we significantly modified the arrangement of the reading laboratory; and in this article, we hope to offer some insight into the planning and utilization of space in a college reading laboratory.

Figure 1 depicts the floor plan for the new university reading laboratory which measures 30 feet by 30 feet. When the footage for furniture is subtracted, there remains about 30 square feet per student for a class size of twenty. This per student footage is a bit more than the 25 square feet per student recommended by Karwin (Maxwell, 1979, 135). Returning to Figure 1, the reader can see that the lab provides seating for twenty-six students, however, the per class size is limited to twenty students in order to facilitate student movement about the room. This accounts for the larger per student footage.

The old lab was furnished solely with study carrels some of which were triple units with carrels built back to back. Consequently, the old lab was suited only for individualized instruction. As depicted in Figure 1, carrels have been placed along the walls to facilitate twelve students. Dual carrels were selected to allow maximum placement flexibility. Tape players, reading and vocabulary machines are typically used in the carrels. However, three of the nine study tables (30" by 60") placed in the middle of the room are wired with two electrical outlets each so that

Figure 1

Floor Plan for University Reading Laboratory



students can use the equipment there also. With this lab design, it is easy to utilize large group, small group, and individualized instruction variously. Students are able to move about the lab working either in carrels or at study tables.

This flexibility in space use and design also accommodates the use of materials from a multiplicity of sources. Figure 2 includes a representative sample of the materials used in the lab for instructional purposes. Within this selection of materials, there is a wide range of difficulty levels and story lengths. Also, there is a sufficient number of titles in these series to accommodate a wide variety of reading interests.

Figure 3 includes descriptions of the course, the institution, and the function of the reading laboratory in the institutional setting. Because there is no comprehensive reading requirement in the institution, the reading lab fulfills this function to a large degree. Further, because "Developmental Reading Laboratory" represents the sole campus reading course, the university reading lab must be all things to all people. It is both a course and a service. Finally, it must be stressed that student enrollment in the reading laboratory is strictly voluntary--in no instance is a student's enrollment in the laboratory mandatory.

In summary, we designed and furnished a new college reading laboratory with the prime consideration being flexibility in space use which would accommodate:

1. a considerable range in individual differences.
2. student movement in the laboratory.

Figure 2

Materials Used in the University Reading Laboratory

Educational Developmental Laboratories, McGraw-Hill Book Co., NY, NY.

EDL Word Clues, levels G - M, 1979.

EDL Filmstick Series: Mature Interest, Developmental, 1973, 1974, 1975.

Harcourt Brace Jovanovich, Inc., New York, NY.

Improving College Reading, 3rd ed., 1978.

Developing College Reading, 2nd ed., 1979.

Jamestown Publishers, P. O. Box 6743, Providence, RI 02940.

Comprehension Skills Series - Middle Level, 1974.

Comprehension Skills Series - Advanced Level, 1974.

Dictionary Drills, 1980.

Reading Drills for Speed and Comprehension, 2nd ed., 1975.

Selections from the Black, 2nd ed., 1974.

Six-Way Paragraphs, 1974.

Skimming and Scanning, 1978.

Timed Readings, 1980.

Topics for the Restless, 1974

Voices from the Bottom, 1972.

Communacad - The Communications Academy, Box 541, Wilton, CN 06897

The Bergen Evans Vocabulary Program, 3rd ed., 1965.

The Rapid Vocabulary Development Program, 1980.

Wordcraft 3, 2, 1, 1973, 1972, 1969 respectively.

Science Research Associates, Inc., 155 N. Wacker, Chicago, IL 60606

Reading for Understanding, 1 and 2, 1978.

Figure 3

University Reading Laboratory Institutional Description

Developmental Reading Laboratory. This is the name of the reading course and the name of the facility in which the course is taught.

Course Description: Designed to improve the college student's reading skills, rate of comprehension, vocabulary, and study reading.

Course Status: Students enroll in three credit-hours, but receive no graduation credit. Grade points earned from the course are computed in the student's cumulative grade point average.

The Institution. A four-year state university with an enrollment of approximately 17,500 on-campus students. There are seven academic colleges and a school of veterinary medicine. State residents who graduate from an accredited state high school are automatically admitted. Freshmen applicants are required to take the ACT, however, this requirement is enforced uniformly for out-of-state students only. No entry reading tests are administered, nor are reading test services offered on a systematic basis.

The Reading Laboratory in the Institutional Setting. Students enroll in the reading lab voluntarily. About 300 students per calendar year complete the reading course, which is the only reading course, per se, in the university curriculum. Students from all levels, freshmen through graduate school, take the lab as well as community and business people. Reading achievement of students upon entry to the lab ranges from basically deficient to excellent.

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3. a maximum class size of twenty students.
4. varied instructional groupings.
5. the use of materials from a variety of sources.
6. the needs of a large multi-purpose state university with essentially minimal admissions standards.

Beyond this we sought to verify in some objective manner if we were on-target in our plans for design and use of space in the lab. To accomplish this we undertook a two-part study in which we first ascertained our students' learning preferences, and, second, collected observations from five instructors of the reading course in our first semester in the new lab.

Part 1: Lab Students' Learning Preferences

In seeking to identify our students' learning preferences in the setting of the reading laboratory environment, informal student satisfaction surveys were shunned as we felt they would provide imprecise information. We finally settled on a formal instrument, the Productivity Environmental Preference Survey (Price, Dunn, Dunn, 1979). According to the manual for this instrument (p. 1):

> This instrument can be an important and useful first step toward analyzing the conditions under which an adult is most likely to produce, achieve, create, problem-solve or learn . . . the instrument aids in prescribing the type of environment, working conditions, activities, and motivating factors that would maximize individual output . . . it . . . reveals how an employee prefers to produce or learn best, not why.

The Productivity Environmental Preference Survey (PEPS) is a 100 item instrument. Subjects respond to each item with degrees of agreement or disagreement by marking a 5-point Likert scale. The total scale purports to measure 21 variables (See tables 1, 2, 3, and 4 for an itemization of all of the variables). These variables are further clustered into 4 areas (Price, Dunn, Dunn, 1979, p. 2):

Variable cluster 1: Immediate Environment

Variable cluster 2: Emotionality

Variable cluster 3: Sociological Needs

Variable cluster 4: Physical Needs

Reliabilities for the 21 variables range from .29 to .87 (Price, Dunn, Dunn, 1979, p. 20), while eleven of the variables have reliability coefficients of .70 or greater. Dunn and Dunn (1979) and Dunn, Dunn, and Price (1981) discuss the theoretical and practical applications of this approach to measuring student preferences for learning. Both sources are excellent for gaining a fuller understanding of the PEPS Survey. Once administered, the publishers computer score the individual tests and provide individual student profiles which are interpreted as follows (Price, Dunn, Dunn, 1979, p. 4):

> Individuals having a standard score of 60 or more, strongly prefer that area as a factor when they study or work. Individuals having a standard score of 40 or less, do not prefer that factor when they study or work. Individuals having scores that fall between 40 and 60 are varied with respects to how much that area

is important to them.

Along with the individual profiles, the publishers provide a summary profile for the total group with scores distributed on the basis of the critical standard scores of 40 and 60 for each of the 21 variables. Using the group profile for the 21 variables, we felt we could obtain the necessary information about the design and use of space in the laboratory. In the fall semester 1981, our first semester in the new lab, we administered the PEPS to 153 subjects enrolled in several sections of the Developmental Reading Laboratory at the start of the semester.

Table 1 summarizes students' responses to the "Immediate Environment," subscales of the PEPS. The immediate environment subscales yield measures of student preferences for 1) sound 2) light 3) warmth 4) formal room design. Student responses for preference for sound in the immediate learning or work environment shows that over one-half (54.2%) of the population indicated a varied preference for sound. About one-seventh (15.2%) of the population showed a preference for some noise and 30.1% showed a preference for quiet. The summary of student responses for preference for light showed that slightly over one-half (54.3%) of the population indicated a preference for direct light. Forty-five percent reported a varied preference for light. While over three-fourths (78.4%) of the sample stated a preference for cool temperatures in the learning environment, this result was suspect since the PEPS was administered in late summer with outside temperatures hovering at the 100^{0} mark. Student preferences for a formal versus an informal room design revealed that 61.4% of the sample indicated a varied preference. About one-third or 34% sta-

Table 1

Students' Responses to the "Immediate Environment" Subscales of the Productivity Environmental Preference Survey

N = 153

Variable	% students in category 1	% students in category 2	% students in category 3
*1. Sound	30.1	54.2	15.7
	quiet	varies	some noise
	40	60	
*2. Light	.7	45.0	54.3
	indirect	varies	direct
	40	60	
3. Warmth	78.4	21.6	00.0
	cool	varies	warm
	40	60	
*4. Formal design	4.6	61.4	34.0
	informal	varies	formal
	40	60	

Category 1 = standard scores <40.
Category 2 = standard scores >40 and <60.
Category 3 = standard scores >60.
*Reliability coefficient of .70 or greater.

ted a preference for a formal room design, while 4.6% stated a preference for an informal design.

Table 2 summarizes student responses to the "Emotionality" subscales of the PEPS. There were strong capabilities reported by the students of their being motivated (98.7%), persistent (90.2%), and responsible (75.8%). However, over 87% of the sample revealed a strong need for guidance and structure in completing tasks.

Table 3 summarizes the results of student responses to the "Sociological Needs" subscales of the PEPS. The sociological needs subscales yield measures of students preferences for 1) learning alone 2) learning with peers (peer-orientedness) 3) learning under direct supervision (authority-oriented) 4) learning in different sociological settings (several ways). Two-thirds (66.7%) of the sample indicated a strong preference for learning alone, while one-third (33.3%) of the sample stated a varied preference for learning alone. However, on the peer-orientedness scale, only 19.7% of the sample reported a preference for learning alone, while 78.3% reported a varied preference when asked about learning with peers. Over 60 percent of the sample reported a preference for authority which tends to support the trend reported above of a need for structure, though there was reported a stronger need for structure or guidance (87.9%) than there was for direct supervision (60.1%). In fact, almost 40% (38.6%) reported a varied preference when responding to items on the authority-oriented subscale. The strongest trend is seen on the "several ways" subscale. Here, 94.8% stated a preference for alternatives in terms of working alone, with peers, or under direct supervision.

Table 2

Students' Responses to the "Emotionality" Subscales of the Productivity Environmental Preference Survey

N = 153

Variable	% students in category 1	% students in category 2	% students in category 3
5. Self-motivation	00.0	1.3	98.7
	unmotivated	varies	motivated
	40	60	
6. Persistence	00.0	9.8	90.2
	non-persistent	varies	persistent
	40	60	
*7. Responsi-bility	00.0	24.2	75.8
	irresponsible	varies	responsible
	40	60	
8. Structure	.7	11.4	87.9
	needs options	varies	needs structure
	40	60	

Category 1 = standard scores <40.
Category 2 = standard scores >40 and <60.
Category 3 = standard scores >60.
*Reliability coefficient of .70 or greater.

Table 3

Students' Responses to the "Sociological Needs" Subscales of the Productivity Environmental Preference Survey

N = 153

Variable	% students in category 1	% students in category 2	% students in category 3
*9. Learning alone	00.0	33.3	66.7
	with others	varies	alone
	40	60	
*10. Peer-oriented learner	19.7	78.3	2.0
	alone	varies	peer-oriented
	40	60	
11. Authority-oriented learner	1.3	38.6	60.1
	unsupervised	varies	supervised
	40	60	
*12. Several ways	00.0	5.2	94.8
	refer to 5,7,9	varies	alternatives
	40	60	

Category 1 = Standard score <40.
Category 2 = Standard score >40 and <60.
Category 3 = Standard score >60.
*Reliability coefficient of .70 or greater.

Table 4 summarizes the results of the "Physical Needs" subscales. The first four subscales reflect student preferences for auditory, visual, tactile, and kinesthetic learning experiences. Strong preferences were evidenced for visual (70.0%), tactile (60.1%), and active or kinesthetic (98.6%) learning experiences, while auditory preferences were indicated by only 13.1% of the sample, a relatively small proportion of the sample. The majority response when considering auditory experiences as a means for learning was "varied preference" (69.9%). "Multi-sensory" is listed as the dichotomous choice for each of the four modes as the manual for the PEPS (pp. 8-9) recommends that standard scores of 60 or greater are the key scores for determining the preferred mode of learning.

Table 4a summarizes the results of the remaining five "Physical Needs" subscales. In terms of requiring food or drink (intake) during the study, the subjects' majority response was varied (75.2%). The majority response for preferred time of day for learning was "varied preference" respectively for morning versus evening (74.5%); for later morning (73.2%); and, for afternoon (69.3%). Over one-half (58.8%) stated a preference for being able to move about during the learning experience, while 39.9% indicated a varied preference on this factor.

Discussion

Based on the findings from the "Immediate Environment" variable cluster, it was concluded that the lab should facilitate primarily a quiet environment with allowances for some noise. Because less than one percent of the sample stated a preference for indirect light, no plans were made to add indirect lighting; although, the question of whe-

Table 4

Students' Responses to the "Physical Needs" Subscales of the Productivity Environmental Preference Survey

N = 153

Variable	% students in category 1	% students in category 2	% students in category 3
*13. Auditory Preferences	17.0	69.9	13.1
	multisensory	varies	auditory
	40	60	
14. Visual Preferences	1.0	29.0	70.0
	multisensory	varies	visual
	40	60	
15. Tactile Preferences	1.3	38.6	60.1
	multisensory	varies	tactile
	40	60	
16. Kinesthetic Preferences	.7	.7	98.6
	multisensory	varies	active experience
	40	60	

Category 1 = Standard score <40.
Category 2 = Standard score >40 and <60.
Category 3 = Standard score >60.
*Reliability coefficient of .70 or greater.

Table 4a

Students' Responses to the "Physical Needs" Subscales of the Productivity Environmental Preference Survey (continued)

N = 153

Variable	% students in category 1	% students in category 2	% students in category 3
*17. Requires intake	6.5	75.2	18.3
	no food	varies	food
		40 60	
*18. Morning/evening	9.8	74.5	15.7
	evening	varies	morning
		40 60	
19. Late morning	14.4	73.2	12.4
	see 18,20	varies	late morning
		40 60	
20. Afternoon	25.5	69.3	5.2
	see 18,20	varies	afternoon
		40 60	
*21. Needs mobility	1.3	39.9	58.8
	stationary	varies	mobile
		40 60	

Category 1 = Standard score <40.
Category 2 = Standard score >40 and <60.
Category 3 = Standard score >60
*Reliability coefficient of .70 or greater.

ther or not to install individual lamps for the study carrels is an issue which has not been resolved at this writing.

The "Emotionality" variable cluster, in general, substantiates the space design. The lab floor plan depicts a room design in which fixed carrels are arrayed along the walls with study tables arranged in the center of the room. Such an arrangement allows for individual and small group work as well as formal large group presentations. Additionally, assigning 20 students per class to this space designed to seat 26, accommodates student preferences for formal, informal, and varied room uses. The qualifier to this is seen in student responses to the subscale item relating to need for structure. An emphasis on individualized instruction would need to be highly prescriptive in nature, at least in the early phases.

The inconsistencies reported from the "Sociological" variable cluster concerning "working alone" versus "peer-orientedness" long with ambivalence about working under direct supervision tends to support the need for a variety of sociological work patterns. This need for differentiation in sociological work patterns tends to further support the physical design of the lab and its utilization of space for formal and informal instructional purposes.

In the "Physical Needs" variable cluster the population revealed that it had predominately multimodal preferences for visual, kinesthetic, and tactile learning. To an extent, this reinforces the lab's use of materials from a multiplicity of sources. No specific accommodation of the varied preference for food intake is make in the program, however, students

are allowed to bring food and drink into the lab. A majority response was indicated for mobility preference which corroborates the seating of 20 students in a space for 26 students, and, further substantiates the formal and informal uses of the lab space.

Part 2: Instructor Observations

When we first started to work on designing the new reading labor tory space we were worried about moving into a room one-half the size of the old lab. To make the best use of the new space we first reviewed the characteristics of the institution and the range of reading levels of our students from previous semesters. We reconfirmed the use of a variety of materials from a multiplicity of sources. We then constructed a scale drawing of the proposed new space and fitted scaled furniture into this drawing in different arrangements. We constructed and reconstructed the scaled room designs, adding and taking away different proportions of carrels and tables. In arriving at the existing floor plan we invited students from the College of Architecture to review our design.

At the start of the semester, we administered the PEPS to our reading lab students. During the semester the five lab instructors met periodically to compare notes on the new facility. These observations along with the results of the PEPS enabled us to reach three conclusions about the lab design and the use of lab space:

1. Reducing the square footage of the laboratory from 1800 square feet to 900 square feet caused student productivity to increase dramatically. In other words, the old lab space had been too

large.

2. The differentiated space (carrels and tables) along with the mobility factor (20 students in a space designed for 26) was allowing us to do much more with the reading laboratory than we had in the past. In other words, space differentiation and mobility were facilitating increased productivity in a smaller laboratory.
3. The lab space itself was too small in that it did not allow for:
   a. private conferences and counseling with students.
   b. materials development.
   c. intensified instruction for basically deficient readers.

As a follow up to the third conclusion we have made a request for use of a smaller adjacent room in which to carry out these activities.

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